GEORGIA | PEACH STATE PATHWAYS

Career, Technical, & Agricultural Education

BUSINESS & COMPUTER SCIENCE

PATHWAY: Computing

COURSE: Beginning Programming

UNIT: 3.2 Classes and Objects

INTRODUCTION

Annotation: This unit is developed to introduce students to using classes and objects in computer programming. The unit project is designed to be written in Java. Students will have the opportunity to create programs using basic programming techniques.

Grade(s):

X	9th
X	10th
X	11th
X	12th

Time: 3 weeks

Author: Jason Naile

Additional Author(s):

Students with Disabilities:

For students with disabilities, the instructor should refer to the student's IEP to be sure that the accommodations specified are being provided. Instructors should also familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation.

FOCUS STANDARDS

GPS Focus Standards:

BCS-BP-6 Students will design solutions for simple programs using basic programming techniques and constructs.

a. Implement techniques such as conditional statements, iterative statements, and variables to solve simple problems.
b. Utilize basic mathematical expressions to solve simple problems.
c. Use arrays and lists where appropriate.
d. Comment programs to aid program readability.
e. Test and debug simple programs.
f. Analyze and explain simple programs involving fundamental programming constructs.

BCS-BP-8 Students will demonstrate knowledge of the relationships between classes.

a. Utilize Class, Responsibilities, and Collaborator (CRC) in problem analysis.
b. Create UML diagrams to illustrate relationships between classes.
c. Describe and explain the implementation of "is-a" and "has-a" relationships.
d. Describe how using classes implements the ideas of encapsulation and information hiding.

GPS Academic Standards:

ELA11W1 The student produces writing that establishes an appropriate organizational structure, sets a context and engages the reader, maintains a coherent focus throughout, and signals a satisfying closure.

ELA11W2 The student demonstrates competence in a variety of genres.

National Standards:

UNDERSTANDINGS & GOALS

Enduring Understandings:

- After writing classes, the major theme of this unit is creating objects. These objects can then be manipulated by using methods.

Essential Questions:

- What is class writing?
- How are objects created using classes?
- How can objects be manipulated?
- How a program be tested and debugged?

Knowledge from this Unit:

- Students will be able to write a class.
- Students will demonstrate the ability to create objects using classes.
- Students will be able to write methods that manipulate objects.
- Students will demonstrate the ability to properly comment a program.
- Students will demonstrate the ability to test and debug a program.

Skills from this Unit:

ASSESSMENT(S)

Assessment Method Type: Select one or more of the following. Please consider the type(s) of differentiated instruction you will be using in the classroom.

____ Pre-test
____ Objective assessment - multiple-choice, true- false, etc.
__ Quizzes/Tests
__ Unit test
____ Group project
____ Individual project
x Self-assessment - May include practice quizzes, games, simulations, checklists, etc.
__ Self-check rubrics
__ Self-check during writing/planning process
__ Journal reflections on concepts, personal experiences and impact on one's life
__ Reflect on evaluations of work from teachers, business partners, and competition judges
__ Academic prompts
__ Practice quizzes/tests
X Subjective assessment/Informal observations
__ Essay tests
__ Observe students working with partners
__ Observe students role playing
____ Peer-assessment
__ Peer editing & commentary of products/projects/presentations using rubrics
__ Peer editing and/or critiquing
____ Dialogue and Discussion
__ Student/teacher conferences
__ Partner and small group discussions
__ Whole group discussions
__ Interaction with/feedback from community members/speakers and business partners
____ Constructed Responses
__ Chart good reading/writing/listening/speaking habits
__ Application of skills to real-life situations/scenarios
____ Post-test

Assessment(s) Title:

Teacher should observe and check practice assignments leading up to the unit project.

Assessment(s) Description/Directions:

During the first few weeks of the unit, students should be introduced to the various terms and shown the process of creating a class. During this time, students should also be introduced to CRC cards and how to use them. Programs from a textbook or other resource could be assigned as practice problems.

Attachments for Assessment(s):

LEARNING EXPERIENCES

Instructional planning: Include lessons, activities and other learning experiences in this section with a brief description of the activities to ensure student acquisition of the knowledge and skills addressed in the standards. Complete the sequence of instruction for each lesson/task in the unit.

Sequence of Instruction

1. **Identify the Standards. Standards should be posted in the classroom for each lesson.**

   BCS-BP-6 Students will design solutions for simple programs using basic programming techniques and constructs.

   BCS-BP-8 Students will demonstrate knowledge of the relationships between classes.

2. **Review Essential Questions.**
   - What is class writing?
   - How are objects created using classes?
   - How can objects be manipulated?
   - How a program be tested and debugged?
3. **Identify and review the unit vocabulary.**
4. **Assessment Activity**

(Based on a 50 minute period)

Week 1: Introduction to Objects and Classes

Week 2: Practice using Objects and Classes

Week 3: Further practice using Objects and Classes (3 days)

Week 3: Unit Performance Task

Attachments for Learning Experiences: Please list.

Notes & Reflections:

CULMINATING PERFORMANCE TASK (Optional)

Culminating Unit Performance Task Title: **Create a Class Project**

Culminating Unit Performance Task Description/Directions/Differentiated Instruction: At the conclusion of instruction on basic programming techniques, this unit performance task should be administered. The performance task takes place over two entire class periods, and students may perform the task individually or in groups, at the teacher's discretion. Complete specifications and directions can be found in the attachment.

Attachments for Culminating Performance Task:

Rubric for Performance Task:

Java Project

Time Limit: 2 full class periods

For your first project of the semester you will create (implement) a class that was specified on the forum posting from either week. These were real world objects that we analyzed from an object-oriented point of view. You may also choose a new class that was not posted in the forum.

Before you begin implementing the class you MUST write the class on a piece of paper and place it on top of your monitor. I will approve/reject the class you have chosen. The following are good examples: Dog, Person, Superhero, Car. I would encourage you to think outside of the box and chose something fun. Below are the requirements and a checklist for grading.

- Create a class the implement a real life object from an object oriented point of view.
- Include at least two constructors in the class to create objects. One constructor must have a parameter.
- Include at least two accessors and two mutators. Both accessors must return a value. One of the mutators must have a parameter.
- Include at least two instance fields.
- Comment your code and CLEARLY label the items listed above.

Task	Possible Points	Total Points
Class chosen is an object from the real world	1	
Two constructors (overloaded)		
One with parameter	1	
One other constructor	1	
Methods		
Two accessors	1	
One mutator with parameter	1	
One other mutator	1	
Two instance fields	1	
Commenting	2	
Code organization	1	
Total (out of 10)	10	

Comments:

Web Resource Title: Blue Pelican Java

Web Resource Description: This is a site developed by a Java teacher in Texas. He provides the resources (textbooks, assignments, etc.) free of charge to teachers.

Web Resources: http://www.bluepelicanjava.com/

Title of Student Work Sample: LumberJack Class

Student Work Sample Description: This student created a LumberJack class that can be used to create LumberJacks. It is very creative.

Student Work Sample: LumberJack java file

Title of Teacher Commentary: Teacher's commentary for LumberJack class.

Description of Teacher Commentary: This includes a graded rubric, as well as general comments provided to students.

Teacher Commentary Sample:

APCS Project 1 (Performance Test)
Time Limit: 2 full class periods

For your first project of the semester you will create (implement) a class that was specified on the forum posting from either week. These were real world objects that we analyzed from an object-oriented point of view. You may also choose a new class that was not posted in the forum.

Before you begin implementing the class you MUST write the class on a piece of paper and place it on top of your monitor. I will approve/reject the class you have chosen. The following are good examples: Dog, Person, Superhero, Car. I would encourage you to think outside of the box and chose something fun. Below are the requirements and a checklist for grading.

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One with parameter	1	1
One other constructor	1	1
Methods		
Two accessors	1	1
One mutator with parameter	1	1
One other mutator	1	1
Two instance fields	1	1
Commenting	2	1.5
Code organization	1	1
Total (out of 10)	10	9.5

Comments:
Please include proper comments/documentation for each method that you write. Otherwise, great job. This was a very creative and well done project.

Grade 9.5/10

UNIT RESOURCES

Web Resources:

Attachment(s):

Materials & Equipment:

Computer

Java Software Development Kit (5.0)

Java Integrated Development Environment (Dr. Java, BlueJ, JBuilder, Eclipse, etc.)

Network storage space

What 21st Century Technology was used in this unit:

X	Slide Show Software		Graphing Software		Audio File(s)
X	Interactive Whiteboard	X	Calculator		Graphic Organizer
	Student Response System		Desktop Publishing		Image File(s)
	Web Design Software		Blog		Video
	Animation Software		Wiki		Electronic Game or Puzzle Maker
	Email		Website		